Watershed Profile:

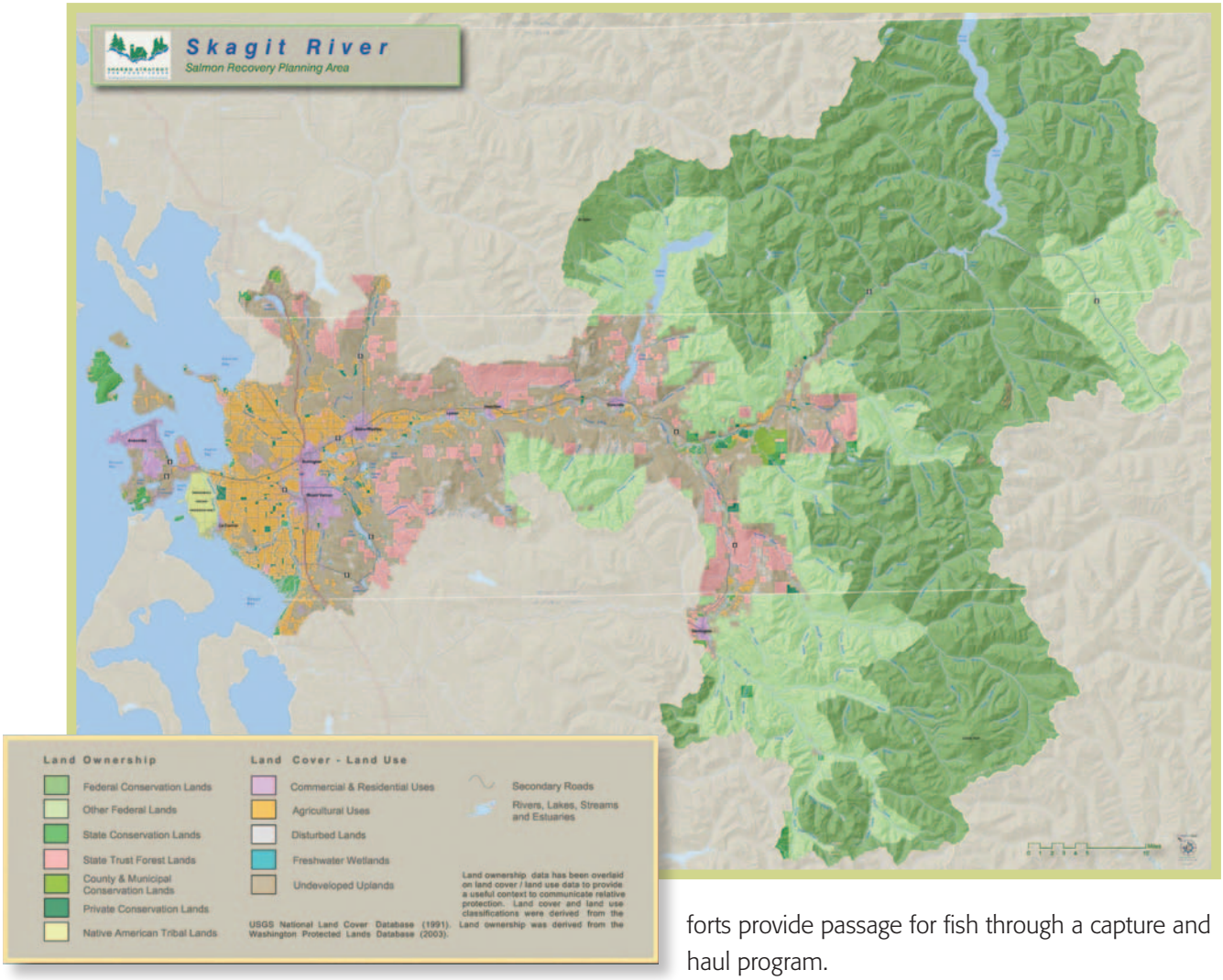
Skagit

The Place and the People

The Skagit is the largest drainage that flows into Puget Sound and the third largest river on the West Coast of the continental United States. It contains the largest and healthiest runs of wild Chinook and pink salmon in Puget Sound and is home to all six species of Pacific salmon, including steelhead.

The 3,100-square mile Skagit River watershed runs for 125 miles from the Cascades of British Columbia, Canada, into the state of Washington, and drains into Puget Sound, 60 miles north of Seattle. The upper half of the watershed is primarily within Mount Baker-Snoqualmie National Forest and North Cascades National Park.

The Upper Skagit combines with the Sauk/Suiattle river system just above Concrete. The upper elevations of these watersheds, most of which are already in designated wilderness, provide critical habitat for species such as king fishers, grizzly bears, and wolves. The wetlands adjacent to these rivers support the globally rare Salish sucker, juvenile salmon, and amphibian breeding sites. The riparian and conifer forests provide habitat for migrant birds, many of which are undergoing population declines in the Pacific Northwest. The Upper Skagit,



Sauk and Suiattle rivers are designated as Wild and Scenic, and the Sauk River is one of the largest un-dammed river systems remaining in the Pacific Northwest. The Skagit River Valley is a favored wintering area for bald eagles. This impressive gathering of bald eagles, one of the four largest in the contiguous 48 states, coincides with the spawning of chum salmon.

The Upper Skagit River is also home to the region's only major complex of dams, which are built near the upstream extent of previously-documented anadromous use. These dams — Diablo, Ross and Gorge — supply about 25 percent of Seattle's power demands. The Baker River, a tributary to the Skagit, also has two dams. These dams created barriers for Chinook and sockeye runs. Current efforts provide passage for fish through a capture and haul program.

The mainstem of the Skagit flows for miles through forest and agricultural lands that are dotted with small towns and individual residences. Most of the 104,000 people of Skagit County live and work in the lower mainstem areas where the river flows by Sedro-Woolley and then separates the rapidly growing cities of Burlington and Mount Vernon.

Interstate-5 transects the lower watershed where the floodplain landscape transitions into the vast Skagit Delta. Just below Mount Vernon and the interstate, the mainstem splits into the North and South fork at the beginning of Fir Island. Where the Forks of the river split, Fir Island begins. The North Fork of the Skagit drains into Skagit Bay south of La Conner and the South Fork empties into Skagit Bay just north of Camano Island.

The native people developed their culture based on the seasonal abundance of the land and sea. This relationship grew for centuries, resulting in a harmony with their surroundings. They thrived until white settlers came to the region bringing with them illnesses that devastated the local tribes. Today, the Native Americans are a small percentage of their original numbers. They are organized in three recognized tribes with treaty fishing rights; Swinomish, Upper Skagit and Sauk-Suiattle. Harvesting the bounty from the Skagit watershed continues to be a fundamental cultural tradition and economic resource for the tribes. However, as these natural resources have declined, they have broadened their economic pursuits to survive.

Since white settlers first arrived in the 1850s, the Skagit River has experienced a constant rush of development. Miners burrowed into the ground and worked the river looking for gold. Loggers cut old-growth pine and Douglas fir and sent the timber downriver. Along the river delta, railroad companies leveled and filled the landscape to place tracks to carry the logs. Farmers diked and drained the land so they could plant on the rich arable soils of the delta.

Today the Skagit Delta is a highly productive farming region, producing everything from tulips to rutabagas. A 2001 study estimated the region generates $262 million in crops and a total of $500 million in economic activity, including recreation.

Photo by Dan Kowalski

While 700 generational farms utilize 90,000 acres of the lower watershed, there's increasing pressure for residential development, too. The rich soils of the river's broad delta support the region's most productive farmlands appreciated not only for their crops of berries, potatoes, and organic vegetables, but especially renowned for their bright fields of daffodils and tulips.

Today, even with the dramatic changes to the landscape, there remains a significant amount of ecological function. This area currently contains large concentrations of wintering waterfowl, shorebirds, and raptors. A significant portion of an entire Trumpeter Swan population winters at the site, as well as the entire gray-bellied Brant population. Birdwatchers are known to screech on their brakes in early spring to catch the inspiring sight of hundreds of snow geese rising off the fields in a graceful wave and settling down again a few feet away.

Photo by Dan Kowalski

These estuarine and intertidal ecosystems of the delta also play a fundamental role in salmon health, and the river's aquatic resources have suffered amid this rapid development of the Pacific coast. Studies now show that roughly 72 percent of historic tidal marsh habitat in the delta has disappeared since settlement. The Skagit Chinook populations of today are much less abundant and productive than their historic counterparts. These changes

Photo courtesy the Washington State Salmon Recovery Funding Board

occurred for many reasons and across many sectors.

The people of the Skagit care deeply about their place. This is reflected in the numerous farm organizations supporting the local agricultural community and the strong advocacy of the tribes and numerous others supporting the protection and restoration of the river for salmon and other species. Both the tribes and the farmers have a long history in the Skagit, Tribes for many centuries and farmers for many generations. It is a place where the people are connected to the land and water through their history and their daily lives. Because of its regional and national importance for fish and wildlife, and natural beauty, the Skagit is also a place that receives much attention from national organizations.

In the mid-1990s the broad interest in the salmon was focused through the creation of the Skagit Watershed Council. The Skagit Watershed Council (Watershed Council) is "a community partnership for salmon restoration" of over 40 diverse organizations, dedicated to voluntary protection and restoration measures that foster natural landscape processes that sustain salmon and aquatic resources. Members of the Watershed Council have completed restoration projects for tributary streams, sloughs, and floodplains in the delta and upstream; fish monitoring programs that focus on juvenile salmon, abundance of prey, vegetation and river channel form; acquisition of land and conservation easements; sediment reduction from roads through culvert placement; invasive species management; and feasibility studies and assessments.

The collective efforts of the members of the Watershed Council, the tribes, farm groups and Skagit County have combined to implement numerous restoration projects to improve the conditions for salmon. The strong interests in the Skagit have also brought conflict between those who advocate for farming and those who advocate for the fish. However, in the last couple of years, leadership from both groups is finding ways to work together and develop solutions to meet their mutual interests.

The 2005 Skagit Chinook Recovery Plan was developed by the Swinomish Indian Tribal Community, the Sauk-Suiattle Indian Tribe, and the Washington State Department of Fish and Wildlife (WDFW). This plan is summarized in the following sections of the profile. The Tribes and State hope to engage local groups and individuals to improve the plan and gain commitments for implementation to recover the salmon. They see the Skagit Plan as one pathway to achieve recovery goals but recognize the complexities of implementing recovery actions and the importance of securing support from a host of stakeholders. They welcome the views

of others and seek to engage others in exploring methods that address the conditions necessary for the recovery of Chinook

Skagit Salmon

Ten anadromous fish species exist within the Skagit Basin. These include Chinook salmon (with six populations); pink salmon; chum; coho; sockeye; summer and winter run steelhead; sea run cutthroat trout; and Dolly Varden and bull trout. The six Chinook populations are the focus of this recovery plan but improvements for Chinook populations are anticipated to benefit other salmon species as well. These populations include: Lower Skagit, Upper Skagit, Lower Sauk, Upper Sauk, Cascade, and the Suiattle. The Upper Cascade, Suiattle and Upper Sauk populations comprise the Spring Management Unit. The Upper and Lower Skagit and Lower Sauk populations comprise the Fall/Summer Management Unit.

The six populations of Chinook use different parts of the river for spawning and some of their rearing. Lower Skagit mostly spawn in October in the Skagit mainstem and tributaries below the Sauk River, primarily between the Sauk and Sedro Woolley. Upper Skagit are those Chinook that spawn in the Skagit mainstem and its tributaries upstream of the Sauk River primarily from September through early October. The Lower Sauk spawn from September through early October in the Sauk mainstem and its tributaries (except the Suiattle) mostly between Darrington and the mouth of the Sauk. Upper Sauk spawn from late July through early September mostly between the mouth of the Whitechuck River and the confluence of the North and Sound Forks. Suiattle spawn from July through early September in the tributaries to the Suiattle River. Upper Cascade spawn in the Cascade River and its larger tributaries upstream of the canyon, beginning at river mile 7.8.

Recovery Goals

The goal of the plan as established by a 1994 Memorandum of Understanding between the Skagit Tribes and the WDFW is to restore Skagit Chinook to optimum levels. Optimum levels are defined as:

1. Levels that provide sufficient harvestable Chinook salmon to the tribes and the State to meet incidental harvest needs;
2. Provide meaningful directed harvests at levels consistent with treaty-reserved fishing rights; and
3. Meet Treaty/Non-treaty allocation objectives while protecting and enhancing the diversity, abundance, and productivity of wild Skagit Chinook and their ecosystems.

		Current	Recovered			
Management Unit	Population	Recent 3-year Average	Low	Recruits/ Spawner	High	Recruits/ Spawner
Skagit Spring Management Unit		1,120	1,200	3.0	4,800	1.0
	Upper Cascade	330	290	3.0	1,160	1.0
	Suiattle	420	160	2.8	610	1.0
	Upper Sauk	370	750	3.0	3,030	1.0
Summer/Fall Management Unit		11,900	10,630	3.5	47,630	1.0
	Lower Skagit	2,300	3,900	3.0	15,800	1.0
	Upper Skagit	8,920	5,380	3.8	26,000	1.0
	Lower Sauk	660	1,400	3.0	5,580	1.0

In calculating the quantified representation of this goal, the co-managers recognize the significant difference between years of high and low marine productivity which over the last 30 years has varied by a factor of three. The goals set forth by the co-managers are consistent with the range described by the Technical Recovery Team as necessary for sustaining viable populations.

Photo courtesy the Washington State Salmon Recovery Funding Board

The goals were affirmed again as part of the Shared Strategy process in March 14, 2002 in a letter from the co-managers. These goals, which apply to 1990's average marine survival, and would be adjusted for natural fluctuations in marine survival, are in the table below. The populations are clustered by Management Units. The cumulative total for the three populations within each management unit is also provided.

The goal for diversity and spatial structure is to preserve the diversity of habitats and life history strategies that support Chinook salmon viability and production.

Harvest and Hatchery

The Skagit Tribes also specifically quantified annual terminal harvest goals as:

Near-term: 500 springs and 20,000 summer/falls

Longer-term: 1,000 springs and 30,000 summer/falls

What is the current status of the Threatened Salmon populations?

Skagit Chinook populations have been on a long decline over the last century. This is demonstrated by the significant declines in harvest from 40,000-50,000 in the 1930's to only a few hundred in the 1990s. The productivity of the populations has been less than one for the last twenty years, meaning that the returning fish number less than their parents. Recently, although the number of fish spawning in the river has been relatively stable, the number of juveniles produced by these spawners has been dropping, indicating there may be a significant recent loss in the ability of the habitat to allow for egg and juvenile survival.

What are the factors that are currently affecting the populations?

The Skagit River system still retains a significant amount of ecological and biological function. It is due to the significant amount of remaining habitat complexity, intact process function and high quality habitat that the Skagit has the most robust populations in Puget Sound. Nevertheless, the populations are at less than fifty percent of their historic abundance.

The Skagit recovery plan thus lists a number of factors limiting Chinook production based on results of decades of research, monitoring, and analysis. They did not consider the ocean a limiting factor but evaluated results based on favorable, unfavorable and worst case ocean conditions. Factors identified as limiting recovery are (1) seeding levels

(density of spawners and juveniles), (2) degraded riparian zones, (3) poaching, (4) current hydroelectric operations, (5) sedimentation and mass wasting, (6) flooding, (7) high water temperatures, (8) hydromodification, (9) water withdrawals, (10) loss of delta habitat and connectivity, 11) loss of pocket estuaries and connectivity, and (12) illegal habitat degradation.

Estuary rearing is considered to be the most significant bottleneck at the current time. It is likely that there is competition for rearing space between the different populations and that habitat capacity is limiting for fish that rear in Skagit Bay, the delta and pocket estuaries.

Habitat

The main factors that limit Chinook production are:

Under seeding: Lower Sauk, Upper Sauk, and Upper Cascade populations may have less spawners than the habitat could support, but that is indeterminate at this time. The plan acknowledges that, if seeding level is a constraint, it is possible to address this through habitat, harvest or hatchery actions. The plan proposes addressing this factor through a combination of harvest actions and habitat improvements directed at survival. Hatchery supplementation is another option but is not being pursued in the Skagit at this time.

Riparian: Assessments have been completed for each Watershed Analysis Unit (WAU) and linked to the populations which are affected. The Lower Skagit, Upper Skagit, and Suiattle rivers all have significant riparian degradation. The areas which support spawning and early rearing for these respective populations are roughly 38-75% degraded. The Lower Sauk is heavily degraded in some areas and has areas of good function in others. The Upper Sauk has a more consistent level of moderate degradation. The Upper Cascade has good riparian habitat.

Poaching: The Suiattle population appears to be the hardest hit by poaching activities. After a crackdown on poaching in 1995, escapement of this population increased immediately from 200 fish per year to 450 fish. As poaching is an illegal activity, estimates of its impact are hard to determine. However estimates are that illegal harvest may account for 10-50% of the returns for the Suiattle population in some years. The other populations are also believed to be affected by poaching.

Dam operations: Significant improvements to mainstem dam operations have occurred over the last decade. Issues like the de-watering of Chinook redds have largely been addressed by the mainstem Skagit dams. Nevertheless, the construction of the Baker Lake dam caused a loss of approximately 60 miles of Chinook habitat and this and other impacts from the dams still need to be addressed. The Baker River dam mostly impacts Lower Skagit population but can influence all populations as they migrate and rear.

Sedimentation and mass wasting: The primary causes of human-caused sedimentation are road failures and clear-cutting. These human-induced events build on already high natural sedimentation levels in the Sauk-Suiattle Rivers from glacial run-off. Sediment budgets show current levels are higher than historic levels and are contributing to both the scouring and filling of the channel. The Lower Skagit Fall population is the worst in the system for incubation survival, while the Upper Skagit population is relatively good. The Lower and Upper Sauk populations are impaired by high sediment loads. The Suiattle system is largely pristine except there

Photo courtesy the Washington State Salmon Recovery Funding Board

is one area which, due to geological instability combined with clearcuts, has significantly impacted incubation survival. Upper Cascade population currently has good incubation survival, though several roads have the potential to fail and cause serious problems. The Upper Cascade population faces high sedimentation levels downstream that may limit their rearing success.

Flooding: The greatest impact on egg-to-fry survival is flooding during egg incubation. Severe floods (15-20 year events) reduce survival by 75-80% when compared to 1 year flooding events. Ten year events reduce survival by 33%. In the Skagit, flood events are increasing in frequency and magnitude, which has serious impacts on survival. Flood events are especially severe in the Lower Skagit where the full brunt of a flood must be absorbed. Lower Skagit impacts are further magnified by increased impervious surfaces, land clearing and drainage networks that contribute to increased flows. Upper Cascade, Suiattle, and the Upper Sauk are all considered to be hydrologically functioning areas. Even though the Lower Skagit populations are hit hard with flood events, it is the Lower Sauk population that appears to suffer the greatest losses.

High water temperatures: High temperatures are caused by removal of riparian areas and reductions in stream flow. Eleven of the Lower Skagit tributaries are currently on the State's 303 (d) list. Four of these are known to significantly impact Chinook production.

Hydromodification: Hydromodification occurs in many parts of the Skagit system, though the Lower Sauk, the Lower Skagit mainstem and the delta have experienced the greatest loss. The Lower Skagit for instance has lost 60% of its natural banks and off-channel areas. Research has shown that the Sauk sub-yearlings use natural banks five times as much as hardened banks. Further upstream, the Sauk remains a highly dynamic system with hydromodification occurring in only a few specific locations. The Cascade system remains unmodified. The Suiattle system has four spots identified as issues necessary to address.

Water withdrawals: Existing flows are often below optimum levels for Chinook and increasing pressures for withdrawals are high. The Lower Skagit population is most impacted by low flows. Further increases in withdrawals would likely affect Upper Skagit and Sauk populations.

Loss of delta habitat: Habitat loss in the delta areas has been significant over the last two centuries. 87.7 percent of delta channel edges and blind channel habitats have been lost with a 73 percent overall loss of delta area. Most of the remaining habitat is on Fir Island with a fringe of estuarine habitats that extend from La Conner to the north end of Camano Island.

Loss of pocket estuary habitat and connectivity: Whidbey Basin plays a key role in supporting juveniles that have recently left the Skagit River system. Unfortunately there has been an 80 percent net reduction in pocket estuary habitats in this area that are used by Chinook. For the pocket estuaries that serve the greatest number of fish, those in close proximity to the delta, the loss is even higher at 86 percent. Studies show that increases in connectivity between habitats in the delta and adjacent shorelines corresponds to increased Chinook abundances and is correlated to higher growth rates and lower predation.

Availability of prey species: It is unknown at this time if forage fish production in Puget Sound is sufficient to support populations.

Illegal habitat destruction and degradation: Illegal actions occur that result in habitat destruction and degradation. Individual actions can cause significant impacts to the populations and also the cumulative impact of multiple actions is destructive to recovery efforts over time.

High seas survival: Ocean conditions significantly alter survival of populations. Good marine survival (estuary through return spawners) is approximately 1.5 percent and during low survival conditions can drop as low as 0.5 percent.

The following issues are not currently considered to be limiting: hatchery fish predation in rivers, river temperatures during incubation (dam-caused changes), small hydro impacts, nutrient/carcass/productivity levels, bird predation, competition/predation by other fish, disease, hatchery fish predation and competition in the estuary and Whidbey Basin, and marine mammal predation.

Photo courtesy the Washington State Salmon Recovery Funding Board

Harvest and Hatchery

Harvest rates have been reduced, in accordance with the Comprehensive Management Plan for Puget Sound Chinook: Harvest Management Component, to levels that should not impede recovery. Similarly, hatchery practices have been modified, in accordance with the Hatchery 4(d) rule and HSRG recommendations, so as to minimize impacts on wild Chinook. Consequently, by adhering to these plans, neither harvest nor hatchery practices are considered to be key limiting factors at this time.

Overall Approach to Recovery

The Skagit Plan proposes actions that if implemented would meet the recovery goals established by the co-managers for each of the six populations of Chinook. The plan is based on empirical data collected over the past 15 years. The foundation of the approach is the identification of the factors that are limiting the population at each step in their lifecycle and management tools (harvest, hatchery or habitat) that could be applied to resolve the issue. Harvest and hatchery management plans have already been developed which contribute to salmon recovery. The main approach was thus to create a comprehensive habitat program which could complement the harvest and hatchery efforts already underway and show how the programs act in concert for recovery.

The overarching habitat strategy is to approach protection and restoration of the system from a process-based and landscape scale. Within this context, a life cycle model was used to systematically and scientifically determine the actions most important for recovery of all six populations. Actions are provided at the largest scale possible and are designed to protect and restore processes.

Four different juvenile Chinook life history strategies have been identified in the Skagit; yearlings, parr migrants, tidal delta rearing migrants and fry migrants. Because of differences in habitat use, yearlings and parr migrants depend more on abundant and high quality freshwater habitat while tidal delta rearing migrants and fry migrants depend more on estuarine habitats (tidal delta and pocket estuaries). This difference in habitat use by individual life history strategies helps shape the habitat recovery actions proposed in the plan. Habitat recovery actions are proposed that benefit each life history strategy in an effort to maintain and strengthen diversity of Skagit Chinook as well as their abundance, productivity and spatial structure.

Successful recovery depends on the ability to produce an overall gain in the factors which support viable populations. The plan proposes actions that if implemented are intended to protect the existing

Photo by Dan Kowalski

level of production. If current conditions do not degrade then the restoration efforts will be able to more effectively increase the productivity of habitat in the watershed and the six populations.

In regard to habitat restoration, the plan proposes a diversified approach to recover wild Chinook populations based on the current limits they face. The restoration efforts ensure the most certainty for recovery and that there is no undue burden on any specific land use or governmental jurisdiction. The balanced portfolio of actions is comprised of identified opportunities across the basin.

Key Strategies and Actions supporting the overall approach to recovery

The plan lays out recovery actions as follows:

- Habitat protection
- Habitat restoration
- Harvest management
- Artificial production
- Research and monitoring

Actions proposed in these areas are modeled to bring all six populations to a recovered state.

Habitat Protection and Restoration

The plan recognizes that authority and responsibility for habitat protection and restoration as it pertains to salmon recovery ultimately rests with every landowner and permitting authority charged with making decisions regarding how a piece of land will be developed and managed. The ability to reach recovery is based on taking the appropriate steps towards restoration while not reducing the current productivity of the system. Therefore the plan provides recommendations regarding those measures necessary to ensure that there will be no loss of productivity and that current habitat conditions for the fish not worsen.

Protection strategies focus on stream flows, basin hydrology, water and sediment quality and sediment transport, stream channel complexity, riparian areas and wetlands, tidal delta areas and nearshore, fish passage and access. Their strategy depends on adoption of adequate regulatory safeguards, vigorous enforcement of regulations, adequate incentives to promote voluntary protection, local planning that incorporates the needs of salmon in planning processes, and a desire on the part of the public and elected officials to provide for those habitat elements necessary to sustain recovered salmon populations. In the face of rapid growth, ongoing monitoring to determine the actual results of protection efforts is noted as critical. The co-managers will seek commitments for implementation of their proposed protection strategy or engage in discussions about alternative solutions.

The restoration strategy assumes that fish respond differently to restoration in some areas. Thus, all areas are not treated equally in their ability to show gains in fish productivity. The relative importance of a restoration action is determined

based on the degree to which it restores landscape conditions in the basin and thus contributes to the long-term recovery of one or more populations. Each life cycle stage has its own restoration strategy. Each proposed action states an expected biological response from the populations and expected changes in physical habitat conditions.

Spawning area restoration seeks to address the causal mechanisms of watershed impairment that lead to degradation or loss of spawning habitat. Largely this focuses attention on hydrology and sediment as two key processes. In Skagit, actions to address this are focused on road improvements, removal of channel constrictions and rip-rap. These actions are projected to increase channel complexity and secondary channels, reduce or eliminate sediments, reduce channel instability, and allow for the reformation of pools and riffles. Actions will increase egg and juvenile survival and rearing capacity.

Freshwater rearing restoration is focused on improvements to floodplain areas. Focus is especially directed where gaps in connectivity are known to exist and habitat restoration opportunities exist. Actions focus on removing or upgrading hydromodification along the main river channels, protecting functioning floodplain habitat, restoring natural floodplain processes and/or reconnecting historic floodplain channels. These actions are projected to increase riverine wetland areas, increase accessibility to off-channel habitats and increase channel edge complexity. This strategy largely benefits parr migrants.

The tidal delta rearing strategy is to increase the amount of tidal marsh habitat and improve pathways that juvenile salmon can find and occupy in the delta. The strategy also identifies the need to better understand the role that transitional habitats (scrub-shrub) and the forested riverine tidal zone play for salmon recovery. Proposed actions are directed at increasing the amount of tidal marsh habitats in the delta including the amount of available channel area. Two actions are also proposed that seek to re-connect juvenile access to estuarine habitats. The results of the implementation of these actions are projected to be significant gains in juvenile productivity and survival.

The nearshore rearing strategy is to increase the opportunity for juvenile salmon to utilize pocket estuary habitat close to their natal rivers and throughout Whidbey Basin and to ensure healthy and functioning nearshore beaches connecting pocket estuaries. This strategy supports juveniles in safely transitioning from fresh to salt water and rearing and traveling within Whidbey Basin. It also benefits forage fish and larger Chinook life history strategies. The strategy requires that the coastal and watershed processes that influence nearshore habitats remain or are restored. High short-term priority has been placed on the tidal delta area and the nearshore areas in close proximity to the natal delta as these currently impede recovery.

Photo courtesy the Washington State Salmon Recovery Funding Board

Harvest Management Actions

Fisheries will be managed according to the 2004 Comprehensive Management Plan for Puget Sound. Actions described in the Skagit Plan were developed through the Comprehen-

sive Management Planning process. This process established new fisheries management actions such that exploitation rates (the percent of adult returning fish harvested by Alaska, Canada and U.S.) will be low enough to allow for the population to rebuild as habitat conditions are improved. It also ensures that harvest (targeted or incidental) will only take place if it does not impede achievement of recovery goals.

Harvest reductions can result in meeting abundance numbers, but cannot affect the productivity of the fish. Harvest reductions only lead to recovery if the habitat available to the increased returning fish supports higher levels of productivity. Harvest reductions are taken in the short-term as protection and restoration actions are taken to improve habitat.

Artificial Production--Hatchery Management Actions

Two management plans cover artificial production and are currently under review by NOAA Fisheries. One plan focuses on hatchery Chinook releases and their potential effects on listed Chinook and summer chum. The other plan deals with other species of salmon. Together, these hatchery plans provide the frameworks for the co-managers to ensure they are meeting the conservation requirements of the Endangered Species Act.

Current hatchery programs for Chinook within the Skagit River have been established for indicator stock purposes. The objective of these indicator stock programs is to obtain representative data on harvest impacts and marine survival of Chinook salmon so that the co-managers get an understanding of how they should conduct harvest management on wild Chinook populations. No new hatchery Chinook programs are proposed for the Skagit at this time, and existing programs will continue as they are currently managed. However, the co-managers have developed contingency plans if one or more of the populations decline to low levels.

Research and Monitoring

The main research strategy is to continue research actions which test and refine the working hypotheses for the basin which form the foundation for the protection and restoration strategies and actions. Recovery success will be evaluated at both the project and the basin-wide scales.

Results

The watershed plan for the Skagit was reviewed by the Puget Sound Technical Recovery Team (TRT: a group of seven scientists) and an interagency committee facilitated by the Shared Strategy staff. The TRT reviewed the plan to determine the degree of certainty that the plan can achieve recovery goals. The conclusions of this analysis are below. For the most part, the issues identified below by the analysis are discussed in the watershed plan, but the reviewers felt they merited particular attention to increase the certainty of achieving plan outcomes. Where the analysis identified key uncertainties, proposals are included for consideration. If implemented along with the watershed plan's other actions, these proposals would increase the certainty of results and achieve the requirements for a recovery plan under the Endangered Species Act.

The six Chinook populations in the Skagit River system belong to a group of ten populations remaining in the Whidbey Basin. The Snohomish and Stillaguamish rivers are each home to two Chinook populations each. Together, these ten salmon runs comprise the Chinook inhabiting a key sub-region in the Puget Sound Evolutionarily Significant Unit. The potential for early success in moving populations out of high risk in the Whidbey Basin is an important part of the regional strategy to reduce risk to the overall ESU. Such a strategy is especially important because salmon runs elsewhere in the Puget Sound face greater constraints, and achieving recovery objectives in those areas is likely to take longer. The TRT and interagency committee

believes that because of the current status of the Skagit populations, the remaining ecological function of the watershed and the technical understanding of what is necessary for recovery, the Skagit River has the potential to support robust populations of salmon once again and plays a key role in Puget Sound recovery.

The Swinomish and Sauk-Suiattle tribes and WDFW crafted a comprehensive technical approach to recover the six salmon populations. A quantitative model was used to demonstrate the biological result of each restoration action and that the collective actions if implemented would reach recovery.

Though the strategies and actions for recovery are technically sound, it will be necessary to develop an adaptive management and monitoring plan to ensure long-term success.

The review process also identified a number of issues and uncertainties that are common to many Puget Sound watersheds. Strategies to address these issues that are contained in this local watershed chapter are a good approach, based on the current state of scientific understanding. Nevertheless, because (1) these issues are very important to the success of watershed approaches to recovery and (2) the effects of some of these strategies on salmon populations at watershed scales are relatively untested, these issues deserve particular attention. Reducing the uncertainties in the issues below could come through local and/or regional inclusion in adaptive management and monitoring programs, regional or local pilot studies to explicitly test their effects, or through additional implementation actions. The complexities associated with these issues are discussed in the regional strategy section of this document or in the regional adaptive management and monitoring program. The "cross-watershed" issues identified are:

- The importance of habitat protection strategies and the need to assess the results for fish from the combination of protection tools available,
- The need to develop H-Integration strategies or, where they are included, to move them further along the integration continuum over time,
- The need to reconcile local nearshore strategies and actions with the regional nearshore chapter,
- The need to address water resources, both water quality and water quantity,
- The need to better link the effects of land use to habitat-forming processes and to habitat conditions. In turn, the effects of these changes in habitat, processes and landscapes on salmon populations need to be estimated,
- The need to develop or complete a robust adaptive management and monitoring program.

If the above uncertainties are addressed, the Skagit watershed will make a significant contribution to the overall ESU recovery effort. It has the opportunity to improve from current conditions in the short-term and the possibility to achieve low risk status for six Chinook populations.

Community Comments

As mentioned previously in this profile, the 2005 Skagit Plan was developed by the Swinomish Indian Tribal Community, Sauk-Suiattle Indian Tribe and the Washington State Department of Fish and Wildlife. Upon completion of the draft plan in June 2005 the Tribes and DFW hoped to engage the broader community to improve the plan as well as gain support and commitments for implementation to recover the salmon.

Following completion of the Draft Skagit Plan (June 2005), Skagit County and the Western Washington Agricultural Association (WWAA) provided detailed written comments to the Tribes, DFW, NOAA and Shared Strategy for Puget Sound. Skagit County and WWAA expressed support for salmon recovery and the specific goals for the Skagit

Chinook. Their comments were directed at how to best achieve the goals and gain specific commitments from affected parties and overall public support. In general, they suggested a broader strategy and activities beyond the predominately regulatory approach proposed in the plan for habitat protection and restoration. They noted a lack of consideration for current efforts by the County, forest landowners and farmers, and the need to address the impacts of urban development.

The Tribes and DFW met several times with some of the stakeholders during the summer and fall of 2005 to understand and consider changes to the plan. Several changes were made and are included in the new draft Skagit Plan (December 2005) which is contained in Volume Two of this Puget Sound Salmon Recovery Plan.

However, the changes have not been fully vetted with the parties and some issues have not been fully addressed or resolved. Further discussions with the affected groups as well as the general public will be necessary to determine the extent to which the plan has addressed the issues and whether additional work remains. These issues include:

1. A more detailed, phased approach to estuarine restoration that addresses needs of salmon and the impacts on agriculture consistent with the Skagit Tribal-Agricultural Accord.
2. Streamside buffers requirements that could be more tailored to site-specific ecological functions and current conditions.
3. Assessment of salmon habitat benefits from the current practices under the Forest and Fish Agreement and newly adopted Forest Practices Rules.
4. Additional details on measurable goals and objectives for the ultimate results of Skagit salmon recovery as well as desired results in the first ten years of implementation.
5. Acknowledgement and assessment of results from current County regulations and practices to protect existing ecological functions.
6. A description of harvest management that clearly defines the actions and results from current and anticipated practices in Skagit River, Puget Sound and Pacific Ocean.
7. Additional definition of how water quantity and quality currently impacts the fish and limits recovery as well as how they will be managed to protect and restore fish runs.
8. How the final Skagit plan will be considered under the State Growth Management Act in regard specifically to the terms of best available science.

The Tribes and DFW have committed to continue discussions in the community with the general public and interested groups. NOAA Fisheries supports continued discussions and is interested to hear from groups and individuals about the draft Skagit Plan.

In response to comments from the WWAA and Skagit County, Bob Lohn, NOAA Fisheries Regional Administrator, sent a letter in October 2005. The following points are important to consider during the public review of the plan.

"The Skagit chapter developed by the Skagit River System Cooperative and Washington Department of Fish and Wildlife (hereafter referred to as the Skagit Co-manager proposal) was submitted late in the Shared Strategy process, but was reviewed for its technical merits by the Puget Sound Technical Recovery Team (TRT). The TRT concluded that the Skagit Co-Manager proposal provided a comprehensive technical basis to recover the six Chinook salmon populations in the watershed and if implemented, would be consistent with the TRT's recommendations for viable populations in the Skagit system.

As issues are resolved in the Skagit Community, these resolutions can be jointly or individually forwarded to NOAA before and during the public

comment period for inclusion during final plan adoption. Clearly, agreements between the Tribe, Skagit County, and the agricultural community will have great influence on what is adopted by NOAA Fisheries Service as a final recovery plan. For areas where no agreement is reached, NOAA Fisheries Service will need to make a determination among competing interests regarding the most appropriate path to take regarding adoption of a final plan."